Student Name: Maitham Ahmed Student id: 20013738 Section #: 1

University of Bahrain
Department of Computer Science

College of Information Technology
ITCS332: Concepts of Programming Languages

QUIZZ#6: Chapter 6_Types

****

- Name the 3 string length options used in programming languages:

1) Static length
C++ example:
char R[] = "SAT";

2) Dynamic length
C++ example:
char R[] = ;

3) loss of Heap dynamic Memory (Limit dynamic string length)
C++ example:
char *R;
int *p = new int[5];
//delete size
char str[size];

- Given a matrix **U: array [0 .. 19, 0 .. 59] of double;** located at memory address starting at 2400. Element size is 5 bytes.

20 60

a) Assuming column major ordering, calculate the address of matrix element U[12, 40].

2400 + ((11 × 40) + 39 × 5)
55 + 195 = 2650 ?

Add(i,j) = Base + [(j-1) × n + (i-1)] × element size

Add(12,40) = 2400 + [39 × 59 + 11] × 5
= 13960

n = ?
20 or 59
59 or 60
i j

b) Assuming row major ordering, calculate the address of matrix element U[12, 40].

Add(i,j) = Base + [(i-1) × n + (j-1)] × esize

Add(12,40) = 2400 + [(11 × 19) + (39)] × 5
= 3640

Student Name: Ali A. Hussain Ebrahim **Student id:** 2003 6424 **Section #:** 1

University of Bahrain
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College of Information Technology
ITCS332: Concepts of Programming Languages

QUIZZ#6: Chapter 6_Types

****

- Write C++ statements defining a fixed stack-dynamic array

```
int a[100];
```

- Write C++ statements suffering from memory leakage problem.

```
int *p = new int [100];
```

- Given a FORTRAN array definition: **`DIMENSION T(250)`** and its base address is 4000, element size is 4 bytes, the address of the array element **`T(99)`** is

4000 + (4 * (99-1))

Given a matrix **`U: array[120 .. 180, 101 .. 199] of double;`** array's starting address is 2400; element size is 4 bytes. Show ALL your calculations.

- Assuming row major ordering, calculate the address of matrix element U[125, 167].

2400 + 4 * ((125 - 120) * ( ) + ( ) * (167 - 101))

- Assuming column major ordering, calculate the address of matrix element U[125, 167].

2400 + 4 * ((167 - 101) * ( ) + (125 - 120))

Student Name: **Student id:** **Section #:**

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QUIZZ#6: Chapter 6_Types

****

- Write C++ statements defining a fixed heap-dynamic array

```
int *ptr = new int [100];
```

- Write C++ statements defining a static string length

```
char str[81];
```

- Given a FORTRAN array definition: **DIMENSION Y(250)** and its base address is 8000, element size is 8 bytes, the address of the array element **Y(121)** is

$= 8000 + 8 * (121 - 1) = 9032$

Given a matrix **U: array [120 .. 399, 120 .. 181] of FLOAT;** array's starting address is 2400; element size is 4 bytes. Show ALL your calculations.

- Assuming row major ordering, calculate the address of matrix element U[250, 160].

$[250, 160] = 2400 + 4 * ((250 - 120) * 62 + (160 - 120)$

$index = base + ele\_size * (r_1 - r_0) * colelem + (c_1 - c_0)$

$188 - 120$

$160 - 120$

- Assuming column major ordering, calculate the address of matrix element U[250, 160].

$[250, 160] = 2400 + 4 * ((160 - 120) * 280 + (250 - 120)$

$2400 + 4 * ((250 - 120) *$

$[r_1, c_1] = base + ele\_size * ((c_1 - c_0) * row\_ele) + (r_1 - r_0)$

$400 - 120$

Student Name: Mohammed Abdullah Fadhl **Student id:** 20052416 **Section #:** 1

University of Bahrain
Department of Computer Science

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ITCS332: Concepts of Programming Languages

QUIZ#6: Chapter 6_Types

****

1) Write C++ statements defining a fixed stack-dynamic array

myarray = new int myarray [10];

int a[100];

2) Write C++ statements defining a limited dynamic string length

Haleline size 10;

Char *string = {"Ahmed", "Mohamed", "Salem"} x[size];

Exceed heap

int *p = new int {

3) Given a FORTRAN array definition: **DIMENSION U(50)** and its base address is 800, element size is 2 bytes, the address of the array element **U(30)** is

address U(30) = 800 + (2 * (30 - 1)) * 2

= 800 + 58 = 858

Given a matrix **U: array[12..150] [20..40] of double;** array starts at address 1600; element size is 8 bytes. Show ALL your calculations.

4) Assuming row major ordering, calculate the address of matrix element U[28][60].

address U[60][28] = 1600 + 8 * ((60-12) * 21 + (28-12)) * 2

5) Assuming column major ordering, calculate the address of matrix element U[60][28]

address U[60][28] = 1600 + 8 * ((28-12) * 139 + (60-12)) * 1.5

Student Name: Ahmed Yusuf Saffar **Student id:** 20037180 **Section #:** 1

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QUIZZ#6: Chapter 6_Types

****

- Given a FORTRAN array definition: **`DIMENSION Y(100)`** and its base address is 3600, element size is 2 bytes, the address of the array element **`Y(70)`** is

Y(70] = 3600 + 2 * (70 - 1

Given a matrix **`U: array [20 .. 120, 50 .. 100] of FLOAT;`** array's starting address is 7500; element size is 4 bytes. Show ALL your calculations.

- Assuming column major ordering, calculate the address of matrix element U[75, 64].

[75, 64] = 7500 + 4 * [(64 - 50) * 101 + (75 - 20)]

1.5

- Assuming row major ordering, calculate the address of matrix element U[75, 64].

[75, 64] = 7500 + 4 * [(75 - 20) * ~~elements/column~~ 101 + (64 - 50)]

2

- Write C++ statements defining a fixed heap-dynamic array

int *p = New int [100];

2

- Write C++ statements defining a static string length

#define length 100;
char Str[length];

2

Student Name: Maitham Ahmed Student id: 20013738 Section #: 1

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QUIZZ#6: Chapter 6_Types

****

- Name the 3 string length options used in programming languages:

1) Static length — C++ example:

```
char R[] = "SAT";
```

2) Dynamic length — C++ example:

```
char R[?];
```

3) loss of Heap dynamic Memory — C++ example:

```
char *R;
```

- Given a matrix `U: array [0 .. 19, 0 .. 59] of double;` located at memory address starting at 2400. Element size is 5 bytes.

a) Assuming column major ordering, calculate the address of matrix element U[12, 40].

2400 + ((11 × 59) + 39 × 5) = 2660 ?

Add(i,j) = Base + [(j-1) × n + (i-1)] × element size

Add(12,40) = 2400 + [39 × 59 + 11] × 5

= 13960

n = ?
20 or 59
59 or 60

b) Assuming row major ordering, calculate the address of matrix element U[12, 40].

Add(i,j) = Base + [(i-1) × n + (j-1)] × esize

Add(12,40) = 2400 + [(11 × 19) + (39)] × 5

= 3640

Student Name: **Student id:** **Section #:**

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QUIZZ#6: Chapter 6_Types

****

- Write C++ statements defining a fixed heap-dynamic array

```
int *x = new int[100];
```

- Write C++ statements defining a static string length

```
char str[81];
```

- Given a FORTRAN array definition: **DIMENSION Y(250)** and its base address is 8000, element size is 8 bytes, the address of the array element **Y(121)** is

= 8000 + 8 * (121) = 9032

Given a matrix **U: array [120 .. 399, 120 .. 181] of FLOAT;** array's starting address is 2400; element size is 4 bytes. Show ALL your calculations.

- Assuming row major ordering, calculate the address of matrix element U[250, 160].

[250, 160] = 2400 + 4 * ((250 - 120) * 62 + (160 - 120))

- Assuming column major ordering, calculate the address of matrix element U[250, 160].

[250, 160] = 2400 + 4 * ((160 - 120) * 280 + (250 - 120))

2400 + 4 * ((250 - 120)

Student Name: [redacted] Student id: [redacted] Section #: A

9

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QUIZ#6: Chapter 6_Types

****

- Write C++ statements defining a fixed heap-dynamic array

int *ptr = new int[7];

- Write C++ statements defining a static string length

char x[100];

- Given a FORTRAN array definition: DIMENSION R(24) and its base address is 1200, element size is 4 bytes, the address of the array element R(12) is

1200 + (12-1)*4

R(12) = 1200 + 4 * (12-1) = 1200 + 44 = 1244

Given a matrix R: array [10..50] [20..120] of FLOAT; array starts at address 400; element size is 4 bytes. Show ALL your calculations.

41 101

- Assuming row major ordering, calculate the address of matrix element R[30][75].

R[30][75] = 400 + 4 * ((30-10) * (120-20+1) + (75-20)) = 400 + 4 * (20 * 101 + 55)

R[30][75] = 400 + 4 ((30-10) * 101 + (75-20))

- Assuming column major ordering, calculate the address of matrix element R[30][75]

R[30][75] = 400 + 4 * ((75-20) * (50-10+1) + (30-10)) = 400 + 4 * (55 * 41 + 20)

R[30][75] = 400 + 4 * [(75-20) * (41) + (30-10)]

Student Name: Sayed Abbas Hashim Ahmed **Student id:** 20054538 **Section #:** 1

University of Bahrain
Department of Computer Science

College of Information Technology
ITCS332: Concepts of Programming Languages

QUIZZ#6: Chapter 6_Types

****

- Write C++ statements defining a fixed stack-dynamic array

```
int F[] = {1, 2, 3};
```

- Write C++ statements suffering from memory leakage problem.

```
char F()
{ char *p = new char('A');
  return p;
}
```

- Given a FORTRAN array definition: **`DIMENSION T(250)`** and its base address is 4000, element size is 4 bytes, the address of the array element **`T(99)`** is

4000 + 4(99 − 1) = 4000 + 4(98)

1 99

Given a matrix **`U: array[120 .. 180, 101 .. 199] of double;`** array's starting address is 2400; element size is 4 bytes. Show ALL your calculations.

- Assuming row major ordering, calculate the address of matrix element U[125, 167].

2400 + 4(125 * 80 + 167)

2400 + 4[(125 − 120) * (199 − 101 + 1) + (167 − 101)]

U[125][167] = 2400 + 4 * [(125 − 120) * 99 + (167 − 101)]

- Assuming column major ordering, calculate the address of matrix element U[125, 167].

2400 + 4(167 * 98 + 125)

2400 + 4 * [(167 − 101) * 61 + (125 − 120)]

Student Name: Ali A. Hussain Ebrahim **Student id:** 2003 6427 **Section #: 1**

University of Bahrain
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College of Information Technology
ITCS332: Concepts of Programming Languages

QUIZZ#6: Chapter 6_Types

****

- Write C++ statements that define a fixed stack-dynamic array

```
int a[100];
```

- Write C++ statements that define a limited dynamic string length

```
// define size 100
char str[size];
```

- Given a FORTRAN array definition: **`DIMENSION T(320)`** and its base address is 4000, element size is 4 bytes, the address of the array element **`T(251)`** is

$4000 + 4 * (251 - 1)$

Given a matrix **`U: array [100 .. 499, 100 .. 131] of double;`** array's starting address is1600; element size is 8 bytes. Show ALL your calculations.

- Assuming row major ordering, calculate the address of matrix element U[220, 120].

$1600 + 8 * ((220 - 100) * 32 + (120 - 100))$

- Assuming column major ordering, calculate the address of matrix element U[220, 120].

$1600 + 8 * ((120 - 100) * 400 + (220 - 100))$

Student Name: [illegible] Student id: [illegible] Section #:

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QUIZZ#6: Chapter 6_Types

****

- Name the 3 string length options used in programming languages:

1) Static length — C++ example: char A[SIZE]; char

2) Dynamic length — C++ example: char R[]; char R[] = {---}

3) loss of Heap dynamic Memory — C++ example: char *R; char* T = New char{---}

- Given a matrix **U: array [0 .. 19, 0 .. 59] of double;** located at memory address starting at 2400. Element size is 5 bytes.

a) Assuming column major ordering, calculate the address of matrix element U[12, 40].

2400 + ((1145) + 39 x 5) ?

Add(i,j) = Base + [(j-1) x (n) + (i-1)] x element size

Add(12,40) = 2400 + [39x59 + 11] x 5
= 13960

n = ? 20 or 59 / 59 or 60

b) Assuming row major ordering, calculate the address of matrix element U[12, 40].

Add(i,j) = Base + [(i-1) x n + (j-1)] x esize

Add(12,40) = 2400 + [(11 x 19) + (39)] x 5

2400 + (12 * 20 + 40) * 5 = 3640

Student Name: Student id: Section #:

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QUIZZ#6: Chapter 6_Types

****

- Write C++ statements defining a fixed stack-dynamic array

```
int *ptr = new [80]
```

- Write C++ statements defining a limited dynamic string length

```
#define size 100
char s[size];
```

- Given a FORTRAN array definition: **DIMENSION T(144)** and its base address is 4000, element size is 2 bytes, the address of the array element **T(63)** is

$$4000 + 2 \times 144$$

- Given a matrix **U: array [120 .. 150, 5 .. 60] of double;** array's starting address is1600; element size is 4 bytes. Show ALL your calculations.

- Assuming row major ordering, calculate the address of matrix element U[130, 55].

$$U[130,55] = 1600 + 4((130-120)*30 + (55-5))$$

- Assuming column-major ordering, calculate the address of matrix element U[130, 55].

$$U[130,55] = 1600 + 4((55-5)*31 + (130-120))$$